

Management of Coronavirus Disease 2019 Intubation Teams

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Some patients infected with the Coronavirus Disease 2019 (COVID-19) require endotracheal intubation, an aerosol-generating procedure that is believed to result in viral transmission to personnel performing the procedure. Additionally, donning and doffing personal protective equipment can be time consuming. In particular, doffing requires strict protocol adherence to avoid exposure. We describe the Emory Healthcare intubation team approach during the COVID-19 pandemic. This structure resulted in only 1 team member testing positive for COVID-19 despite 253 patient intubations over a 6-week period with 153 anesthesia providers on service. (A&A Practice. 2020;14:e01263.)

GLOSSARY

CDC = Centers for Disease Control and Prevention; **COVID-19** = coronavirus disease 2019; **HME** = heat and moisture exchange filter; **IRB** = Institutional Review Board; **PPE** = personal protective equipment; **SARS** = 2003 severe acute respiratory syndrome; **SARS-CoV-2** = severe acute respiratory syndrome coronavirus 2

Some patients who tested positive for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) required tracheal intubation for mechanical ventilation in the intensive care unit. Prior studies examining health care workers diagnosed with 2003 severe acute respiratory syndrome (SARS) identified intubation and bag-mask ventilation as possible sources of aerosol generation.^{1,2} In 1 meta-analysis examining SARS in health care workers, those performing tracheal intubation had an odds ratio for developing SARS of 6.6 in comparison to those health care providers who did not perform this procedure.² As such, it is crucial to have the appropriate personal protective equipment (PPE), protocols, and procedures and to ensure intubation is performed by experienced providers.

Airway management in the coronavirus disease 2019 (COVID-19) patient is resource-intensive. The Centers for Disease Control and Prevention (CDC) recommends providers wear an N95 respirator (or equivalent), face shield, gown, and gloves.³ In China, all health care providers involved in intubation wore a disposable hair cover, a fit-tested N95 mask, an impermeable gown, gloves, eye protection, and shoe covers.⁴ Donning and doffing (removal) of

these PPE can be a difficult and time-consuming process. Self-contamination is a potential risk during doffing.⁵

At Emory Healthcare, anesthesiology led COVID-19 intubation teams were developed for safe, efficient, protocolized airway management by experienced personnel. We posit that the development of these teams has allowed our staff to stay safe and to provide a service that is dependable and reliable. We discuss the creation and the dynamics of our airway teams and methods to guide other centers in establishing a similar response. We believe our team model provides careful stewardship of PPE while minimizing viral exposure.

METHODS

The Emory University Institutional Review Board (IRB) provided a waiver for this report. The Standards for Quality Improvement Reporting Excellence 2.0 standards for quality improvement reporting were followed.

AIRWAY TEAM PERSONNEL

At the start of the COVID-19 pandemic, our airway team at each of the 2 academic hospitals owned by Emory Healthcare consisted of 1 physician anesthesiologist and 1 allied team member (anesthesia assistants and certified registered nurse anesthetists). This team's sole job during their 12-hour shifts was to provide continuous coverage throughout the hospitals, including the intensive care units and emergency department, performing intubations. The physician anesthesiologist performed the intubation with the other team members standing outside the patient's room, to provide intubating assistance or additional supplies as needed. We added an additional team member to the team after the first week because of the extra time required for donning and doffing PPE, as well as to address the increased demand for

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intubations. This third team member was tasked with acting as a runner to obtain additional supplies from the operating room or to prepare for subsequent intubations in the event of simultaneous calls.

EQUIPMENT

Our airway team adapted an airway bag that had been used before the pandemic (Figure 1). In addition to multiple sizes of endotracheal tubes, a portable video laryngoscope, a bougie, supraglottic airways, surgical airway equipment, oral airway, nasal trumpet, we added an endotracheal tube clamp, bacterial/viral heat and moisture exchange (HME) filters, N95 respirators, gowns, full face shields, and goggles. The airway bag remained outside the patient's room during intubation. A video laryngoscope was utilized for all intubations. A foldable, custom-designed transparent acrylic airway box was used in some intubations as an enhanced form of PPE at the discretion of the physician anesthesiologist. Nondisposable items were wiped down with disinfectant wipes inside the patient's room, handed to team members outside the room, and then wiped down again.

PROCESS

While many patient rooms are negative pressure rooms, our routine did not vary. Before entry into the COVID-19-positive patient room, a prebrief is held with all members of the anesthesiology team, the respiratory therapist, and the nurse assigned to the patient. A discussion of everyone's role is reviewed, and an overview of necessary airway

equipment and medications is discussed. Only equipment and predrawn medications (including induction agents, neuromuscular blocking agents, and vasopressors) are taken into the patient room. Most inductions are performed using propofol and rocuronium. Providers have a choice of phenylephrine, norepinephrine, and epinephrine.

All providers in the room wore a face shield, gown, gloves, and a respirator. The respirator was a fitted N95 mask. If the provider was unable to wear an N95, they wore a powered air-purifying respirator. This is verified using a checklist card given to all team members to carry at the beginning of the pandemic and displayed prominently on the patient's door. A respiratory therapist brought and set up a ventilator, with the initial settings being provided by the anesthesiologist. The nurse and anesthesiologist then enter the room. Occasionally an allied team member entered the room at the discretion of the physician anesthesiologist to assist with airway management. After verification of endotracheal intubation, the airway team confirmed appropriate doffing of PPE following the displayed checklist. Doffing of the gown occurred within the patient's room. The remainder of the PPE was removed outside the patient's room. If a second intubation was called in short succession, the team would doff gowns and gloves only and maintain face shields and N95 respirators regardless of proximity of rooms.

COVID-19 HOTLINE AND AVAILABILITY OF TESTING

Emory Healthcare developed a COVID-19 hotline staffed by nurses. All employees who were concerned that they had symptoms were instructed to contact this number. Staff members were asked about symptoms according to guidance provided by the CDC.⁶ Symptoms included fever, chills, cough, shortness of breath, difficulty breathing, fatigue, myalgia, headache, and new loss of taste or smell. Employees were given priority for testing if they reported concerning symptoms.

RESULTS

In the 6 weeks since creation of our COVID-19 intubation teams, a total of 253 intubations were performed (Figure 2). Sixty-four individual anesthesiologists and 89 allied team members staffed the service. During this period, all patients were intubated within 30 minutes of the request for intubation and there were no cardiac arrests, deaths, or emergency surgical airways required during intubation. Figure 3

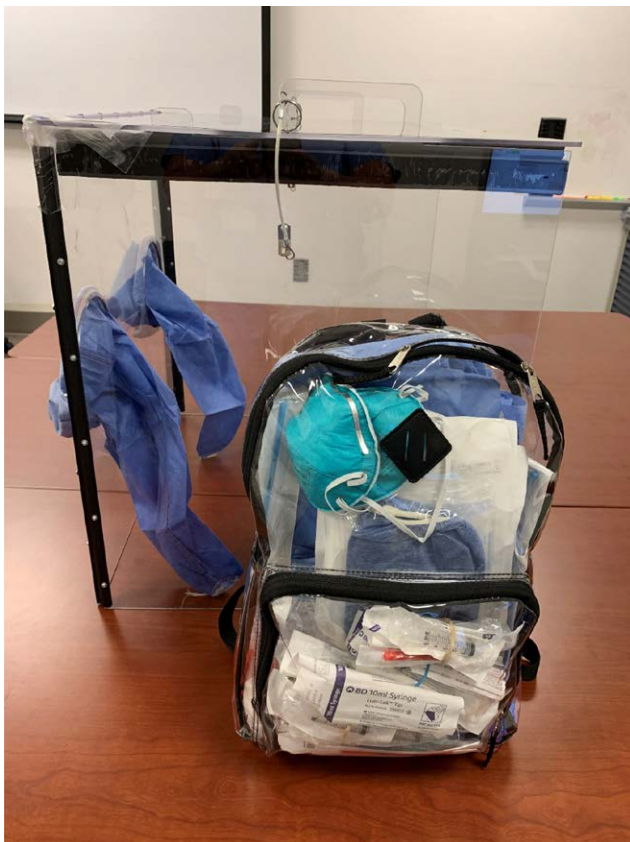


Figure 1. The airway bag and intubation box.

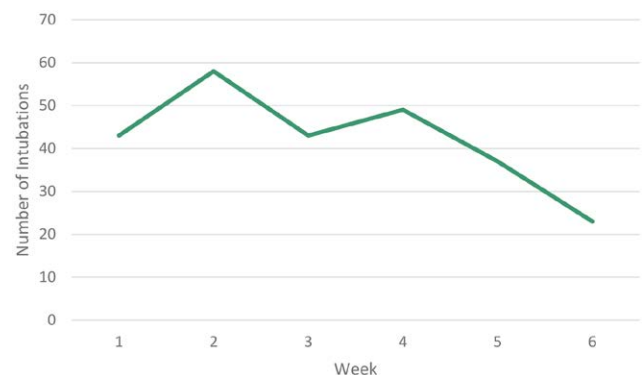


Figure 2. Intubations performed per week.

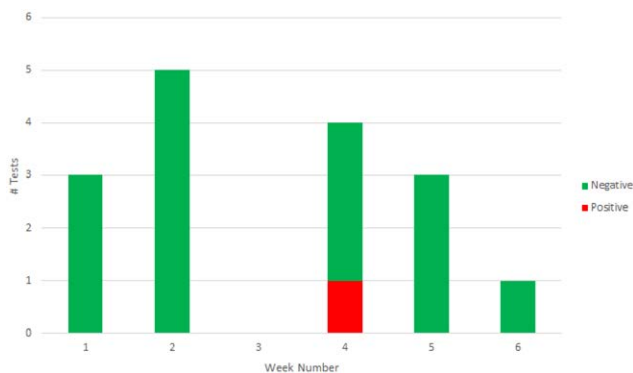


Figure 3. Number and results of SARS-CoV-2 tests performed on team members by week. SARS-CoV-2 indicates severe acute respiratory syndrome coronavirus 2.

demonstrates the temporal relationship of the 16 team members (10.5% of the total team) who requested SARS-CoV-2 testing during this time period. Only 1 member tested positive (0.7%) following a shift on the intubation team.

PPE supplies were adequately maintained through both decontamination of N95 masks as well as through additional health care system procurement. After use, N95 masks were placed into paper bags. They were reused throughout a 12-hour shift and then returned to the hospital inside of a labeled paper bag for decontamination using ultraviolet light.

DISCUSSION

During the 6 weeks described in this article, 253 known COVID-19 patients were intubated with only 1 member being diagnosed with COVID-19 as a result of their study. Mortality is significantly lower in COVID-19 patients cared for in the Emory Healthcare system as compared to other US hospitals.⁷ The structure and availability of the teams may have contributed to these initially reported favorable outcomes by allowing rapid access to intubation performed by attending anesthesiologists.^{7,8} Emory's initial intensive care unit intubation rate of 76% compares similarly to initial reports from Seattle (75%)⁹ and Chicago (86%).¹⁰ Additionally, the team structure, availability of PPE, and strict checklist adherence led to low incidence of infection among members of the intubating team.

Criticisms of this model include the additional expense of maintaining 1 physician anesthesiologist and 2 allied team members dedicated to intubations in each facility, in addition to the regular cohort of staff dedicated to staffing operative cases. Additional criticism may be that other medical professionals, such as emergency medicine or critical care physicians, or even respiratory therapists can perform these intubations for lower cost. The physicians and allied team members are salaried in our health care system. With the elimination of elective operative cases, there was a relative abundance of anesthesiology staff, while these other specialists were frequently busy in the emergency department and intensive care units. Anesthesia providers can intubate patients, but also treat acute complications of intubation.

Having a dedicated airway team not distracted by comanagement of patients in the operating room allows team members to intubate patients without perioperative production pressures. Similarly, self-sufficient airway teams

spared intensivist physician's time intubating patients, allowing them to focus on other aspects of critical care management.

CONCLUSIONS

Dedicated airway teams effectively provide emergency patient care while maintaining staff safety. Safety was enhanced by providing sufficient resources for providers to be able to focus on direct patient care and by the utilization of checklists for the use of PPE. ■■

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DISCLOSURES

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